more to the student of heat engines and the prospective user of this particular type of prime mover.

(1) The keynote to the first volume is undoubtedly the explanation of the actual designing of the marine Diesel engine and its component parts, and it seems quite wonderful that modern practice has so rapidly become to a large extent standardised. The translation from the original has evidently been undertaken by engineers skilled in the practice of their profession and in sympathy with the subject-matter of the text. The original treatise is the work of an Italian specialist in the development of the Diesel motor, Giorgio Supino, whose early decease is a real loss to Italian engineering. Naturally the reader will ask what has this eminent foreign author to say about British-made Diesel engines and British manufacturers; at the end of part i., page 72, is a table giving a list of ships and the types of engine adopted, viz., high speed, low speed, 4 cycle, and 2 cycle, and it is noticeable that one only out of some twenty names is that of a British firm.

This surely is a matter which vitally concerns a manufacturing country such as ours. Recollections of the early years of the petrol motor and motor-car industry and a comparison with the state of our present manufactures makes one devoutly hope that history will repeat itself and that full advantage will be taken of the experience and experimental labours of our Continental competitors, so that the supply for our colonies may come from this country. No discussion on the merits of Diesel engines can be entered upon without reference to that class known as semi-Diesel, which latter are perhaps better termed hot-bulb engines. It is good to think that our output of these is more satisfactory, but the magnitude of the units employed of this class is small compared with that of engines of the Diesel type. It is also good to remember that the engine called semi-Diesel is in reality the direct outcome of the work of an English engineer, Mr. Stuart Akroyd, whose name is associated with the firm of Messrs. Hornsby and Sons, Ltd., in the production of the Hornsby-Akroyd engine, and it would therefore seem a better name for this type of engine that it should be termed "engines working on the Akroyd cycle," rather than "semi-Diesel."

A brief review of the first book shows that part i. deals with a general survey of the types of oil engines in general use, with a discussion on efficiencies. Chapter vi. gives methods of calculating cylinder dimensions; this is succeeded by chapters dealing with the designs of various parts, such as bed-plates, crank cases, engine framing, crank-shafts, pistons, cylinder heads, valves, fuel injection and regulation, etc., all very clearly illustrated by excellent drawings and plates. Methods of reversing marine engines give up-to-date practice, and it is startling to realise that the whole cycle of reversing can be performed in 12 seconds. A final chapter deals with trials and tests of Diesel engines. It would be a help if a tabulated form of "report on a trial" were included, as standardisation is very desirable in any form of comparative tests. From this short review it would appear that the subject-matter is really the complete design of Diesel engines for marine purposes, and as such it is a meritorious addition to engineering literature.

(2) The second volume is a greatly enlarged and much rewritten edition of a work which first appeared in the spring of 1912, almost contemporaneous with the last public appearance of Dr. Diesel in London. The defects of the first edition (which bore traces of hurried preparation) have disappeared, and we now have a copiously illustrated and enthusiastic survey of the progress of the Diesel engine, with many examples of modern types for land and marine installations, and an optimistic claim for its future development as the prime mover for mechanical transport. In this volume are upwards of forty-five folded plates, which give the main dimensions and cross-sections of the chief types of engines constructed. It is satisfactory to note that British types figure more prominently in this book. One of these, viz., the Tanner-Diesel, is shown on page 264. The writer remembers the early struggles of Mr. Tanner to get his designs taken up, and is glad to pen this tribute to his faith and earnestness in carrying through his designs to a successful issue in the face of great difficulties. It will be noticed that the progress made in the last four years has been mainly in the development of the two-stroke cycle type, and the increase of h.p. developed per unit employed. A perusal of the table on page 317 shows that the maximum diameter of cylinder is now 30 inches, and that the maximum h.p. per cylinder is 650 for a 2-cycle engine, but the average h.p. per cylinder is only 230 for this class, and for the 4-cycle slow-speed type the average is only 125 h.p. per cylinder, a figure which represents the performance of the *Selandia,* the boat Londoners had a chance to inspect whilst she was lying in the Thames in 1912. The figures given justify the claim of the author of this book that the 2-stroke cycle is that of the future. To the student and others who desire to understand this engine and its working this volume will be of great service.

It would be interesting to refer to the development of the Diesel engine and its use to extend submarine warfare, but the present is not opportune for any remarks on this point. A. J. M.

OUR BOOKSHELF.

Instincts of the Herd in Peace and War. By W. Trotter. Pp. 213. (London: T. Fisher Unwin, Ltd., 1916.) Price 3*s*. 6*d*. net.

AN interesting and useful sociological survey. The author contends that the subject can really become a science, practically useful by conferring foresight. It is not necessarily only a mass of dreary and indefinite generalities, but may become a guide to the actual affairs of life, giving an understanding of the human mind which may en-

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able us to foretell some of the course of human behaviour. The war brings the chance of testing the truth of this suggestion. It is becoming, obviously, more and more a war of moral forces; and an understanding of the nature and sources of national *moral* must be as important a source of strength as the knowledge of the military engineer.

The author proceeds to discuss the various forms of gregariousness, and finds the British form typified by the bee, the German form by the wolf. The difference is so great that the war is not so much a war between nations as a war between different species. Nature is making one of her great experiments; is setting herself to try out the strength of the socialised and the aggressive types. To the socialised peoples she has entrusted the task of proving that her old faith in cruelty and blood is at last an anachronism. To try them, she has given substance to the creation of a nightmare, and they must destroy this werewolf or die. And a calm consideration of the German and the British mind leaves us in no doubt where the strength lies. In Britain there has been no Hymn of Hate, no "God punish Germany!", no gospel of bluster and frightfulness. These are symptoms of lupine rage. But Britain, fighting for existence and for honour, has quieter and deeper vision; and she will not sheathe the sword until her task is done and a peaceful Europe once more possible, freed from the terror of imminent wanton attack by an aggressive Power.

British Fungi and How to Identify Them. By J. H. Crabtree. Pp. 62. (London: C. H. Kelly, n.d.) Price 1*s.* net.

Our native fungi afford beautiful objects for the photographer, and have been well illustrated in the many popular and scientific works which deal with them. In the little book before us Mr. Crabtree illustrates some forty different species of well-known fungi by means of very good photographs, and each photograph is accompanied by a page of useful descriptive text. By the aid of both text and illustration a particular fungus should be able to be identified without much difficulty. In the case of the somewhat small differences between certain edible and poisonous fungi the ordinary photographic reproduction is not sufficiently clear to show the distinguishing features, and a few good colour prints would have been of value.

In a short introduction of four pages the author gives a concise account of the larger fungi in general—with which only this little book is concerned—details as to the spore-arrangement, etc., and a simple classification. It is unfortunate that Mr. Crabtree's frontispiece, "An unnamed fungoid growth found upon a tree," is not a fungus at all, but is what is known as a "wood flower." This hollow woody growth has been gradually formed about the suctorial portion of some parasitic plant, probably a Loranthus, which has become detached and has left a large tulip-shaped woody scar resembling a fungus on the branch of its host plant.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* Nature. *No notice is taken of anonymous communications.*]

The Primary Sugar of Photosynthesis.

Microchemical tests on the assimilating cells of several plants indicate a considerable concentration of hexoses in the chloroplasts, or in the protoplasm immediately surrounding them. Other lines of experiment suggest that while sucrose is concentrated in the large vacuoles, invertase is held apart from it in the protoplasm.

These facts force upon one the possibility that the pioneer analytical work of Brown and Morris established and extended by Parkin and by Davis and his collaborators, does not after all necessitate the conclusion that the formation of sucrose is a preliminary step to the production of hexoses in the leaf.

It seems more probable that the hexoses are formed from formaldehyde in the chloroplast, and, when their concentration reaches a certain limit, condensation into sucrose due to invertase, or some saccharogenic enzyme, takes place. The sucrose thus formed is passed into, and stored in the vacuole. As the volume of the protoplasm available for the hexoses is small compared to the space allotted to the sucrose, the increase of the total percentage of hexoses will be small when the leaf is exposed to light, while that of the sucrose will be large. Consequently the rise of sucrose on illumination shown in analyses of leaves is not a cogent argument for regarding it as the primary sugar.

The recognition of the localisation of various substances in the cell also supplies an explanation as to how the sucrose-hexose ratio of the cell is maintained in presence of invertase. The absence of invertase from, and the storage of sucrose in the vacuole may be compared to the conditions obtaining in the root of the sugar beet. Only there, of course, the source of sucrose is secondary hexoses. In photosynthesis the condensation of the sugars is probably determined by the fact that for the same rise of osmotic pressure in the vacuole twice the amount of the disaccharide may be stored. When the limiting pressure is reached in this way the condensation of hexoses to starch may give extended elasticity to the economy of the cell.

Henry H. Dixon.
Thomas G. Mason.

School of Botany, Trinity College, Dublin,
April 10.

Isle of Wight Disease in Bees.

Drastic recommendations regarding the disinfection or destruction of combs, hives, and appliances which have come in contact with bees infected by Isle of Wight disease have been made by the Board of Agriculture, and were repeated in an article in Nature of March 2 (p. 7). The recommendations are founded upon the idea of the infectiousness of the disease, and are intimately connected with the recognition of the protozoon *Nosema apis* as the cause of the disease, and with the knowledge of the ease by which this parasite can be disseminated by infected bees. On account of the practical importance of the subject, I would direct attention to the results of experiments bearing upon these points, carried out by Mr. J. Anderson and Dr. J. Rennie, of the North of Scotland College of Agriculture and University of Aberdeen respectively, and communicated at a recent meeting

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